

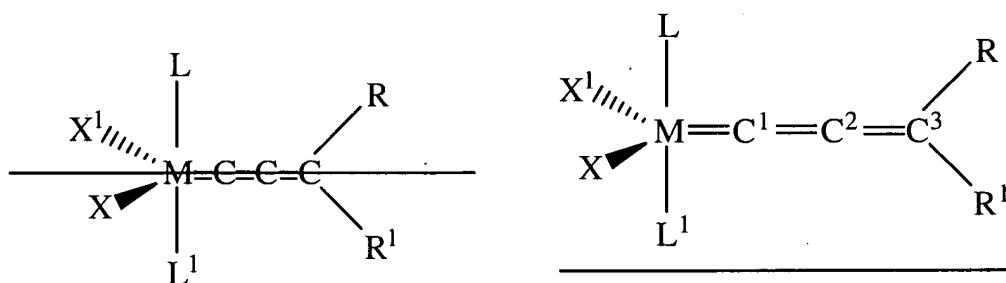
Amendments to the Claims:

This listing of claims will replace all prior versions and listings of the claims in the application:

Listing of the Claims:

1-8. (Cancelled)

9. (Currently amended) A catalytic complex of the formula:



wherein M is Os or Ru;

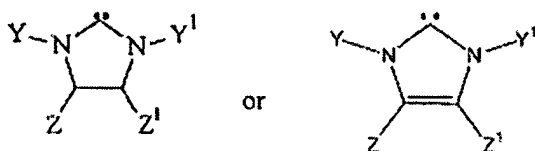
R and R¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl, and C₁-C₂₀ alkylsulfinyl, each R and R¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₁₀ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy, or with a functional group;

X and X¹ are independently selected from the group consisting of anionic ligands;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

L¹ is a nucleophilic carbene.

10. (Cancelled)
11. (Previously presented) A catalytic complex according to claim 9, wherein L is a phosphine.
12. (Original) A catalytic complex according to claim 9, wherein at least 2 of X, X¹, L or L¹ are bonded together to form a multidentate ligand.
13. (Currently amended) A catalytic complex according to claim 9, wherein said nucleophilic carbene is of the formula:

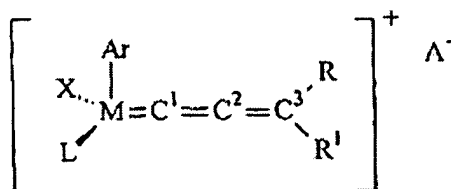


wherein

Y and Y¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ [[C]] alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Y and Y¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ [[C]] alkynyl, [[C₂₁]]C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

14. (Currently amended) A catalytic complex of the formula:



wherein

~~C¹ and C² are sp hybridized carbons and C³ is an sp² hybridized carbon,~~
 wherein either or both of C¹ and C² are optionally absent;

M is selected from the group consisting of Os and Ru;

R and R¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl, and C₁-C₂₀ alkylsulfinyl, each R and R¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₁₀ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy, or with a functional group;

X is an anionic ligand;

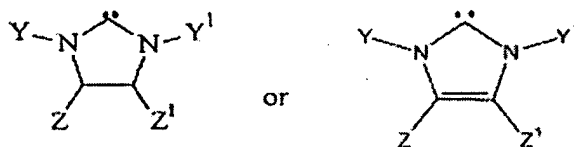
L is a nucleophilic carbene;

Ar is an aryl substituent, bonded to M by an η⁶ bond; and

A⁻ is an inorganic anion or an organic anion.

15-16. (Cancelled)

17. (Previously presented) A catalytic complex according to claim 14, wherein said nucleophilic carbene is of the formula:



wherein

Y and Y¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy and aryloxy, each Y and Y¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹

optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

18. (Original) A method of making a nucleophilic carbene, said method comprising:

- a) contacting a substituted or unsubstituted aniline with an approximately one-half equimolar amount of paraformaldehyde under an inert atmosphere to make a first reaction mixture;
- b) heating said first reaction mixture until said paraformaldehyde dissolves;
- c) adding an approximately one-half equimolar amount of a dialkoxyacetaldehyde to make a second reaction mixture; and
- d) heating said second reaction mixture for a time and under conditions sufficient to make a nucleophilic carbene.

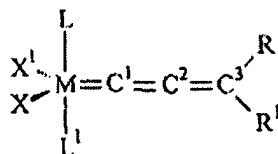
19. (Original) The method of claim 18, wherein said aniline is 2,4,6-trimethylaniline.

20. (Original) The method of claim 18, wherein said aniline is 2,6-diisopropylaniline.

21. (Original) The method of claim 18, further comprising the step of hydrogenating the nucleophilic carbene to produce a non-aromatic nucleophilic carbene.

22. (Cancelled)

23. (Currently amended) A method of performing ring closing metathesis, said method comprising contacting a diene with a catalytic complex under conditions appropriate, and for a time sufficient to produce a cyclic alkene, wherein the catalytic complex has the formula:



wherein M is Os or Ru;

~~C¹ and C² are sp hybridized carbons and C³ is a sp² hybridized carbon~~, wherein C² is optionally absent;

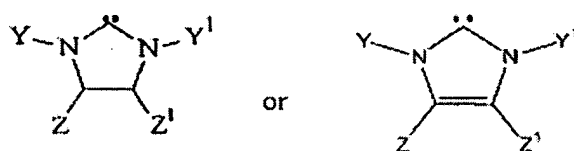
R and R¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl, and C₁-C₂₀ alkylsulfinyl, each R and R' optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₁₀ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy, or with a functional group;

X and X¹ are independently selected from the group consisting of anionic ligands;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

L¹ is a nucleophilic carbene.

24. (Previously presented) The method of claim 23, wherein the nucleophilic carbene has the formula:



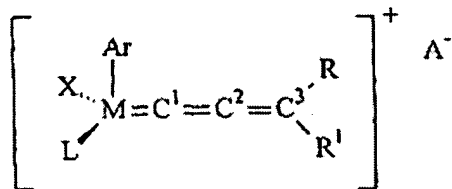
wherein

Y and Y¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Y and Y¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally

being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

25. (Currently amended) A method of performing ring closing metathesis, said method comprising contacting a diene with a catalytic complex under conditions appropriate, and for a time sufficient to produce a cyclic alkene, wherein the catalytic complex has the formula:



wherein

~~C¹ and C² are sp hybridized carbons and C³ is an sp² hybridized carbon,~~
 wherein either or both of C¹ and C² are optionally absent;

M is selected from the group consisting of Os and Ru;

R and R¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl, and C₁-C₂₀ alkylsulfinyl, each R and R¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₁₀ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy, or with a functional group;

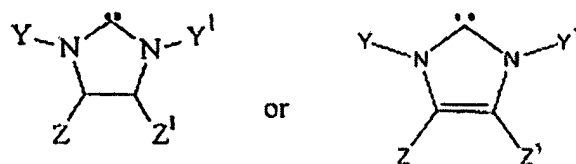
X is an anionic ligand;

L is a nucleophilic carbene;

Ar is an aryl substituent, bonded to M by an η⁶ bond; and

A⁻ is an inorganic anion or an organic anion.

26. (Previously presented) The method of claim 25, wherein the nucleophilic carbene has the formula:



wherein

Y and Y¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Y and Y¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

27. (Previously presented) The catalytic complex according to claim 9, wherein X and X¹ are independently selected from the group consisting of halide, carboxylate, alkoxy, aryloxy, and alkyl sulfonate.

28. (Previously presented) The catalytic complex according to claim 27, wherein X and X¹ are both chloride.

29. (Previously presented) The catalytic complex of claim 9, wherein the nucleophilic carbene ligand comprises a carbene carbon further bonded to two heteroatoms having electronegativity greater than that of carbon, and wherein the heteroatoms are independently selected from the group consisting of nitrogen, oxygen, and sulfur.

30. (Previously presented) The catalytic complex of claim 29, wherein the nucleophilic carbene ligand comprises a saturated or unsaturated 1,3-diheterocyclic compound.

31. (Previously presented) The catalytic complex of claim 9, wherein the complex is linked to a solid support by means of a link between at least one of said anionic ligands and said solid support.

32. (Previously presented) The catalytic complex according to claim 9, wherein the complex is linked to a solid support by means of a link between the nucleophilic carbene and said solid support.

33. (Previously presented) The catalytic complex according to claim 14, wherein X is selected from the group consisting of halide, carboxylate, alkoxy, aryloxy, and alkyl sulfonate.

34. (Previously presented) The catalytic complex according to claim 33, wherein X is chloride.

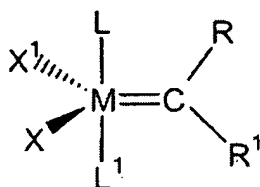
35. (Previously presented) The catalytic complex of claim 14, wherein the nucleophilic carbene ligand comprises a carbene carbon further bonded to two heteroatoms having electronegativity greater than that of carbon, wherein the heteroatoms are independently selected from the group consisting of nitrogen, oxygen, and sulfur.

36. (Previously presented) The catalytic complex of claim 35, wherein the nucleophilic carbene ligand comprises a saturated or unsaturated 1,3-diheterocyclic compound.

37. (Previously presented) The catalytic complex of claim 14, wherein the complex is linked to a solid support by means of a link between said anionic ligand and said solid support.

38. (Previously presented) The catalytic complex of claim 14, wherein the complex is linked to a solid support by means of a link between said nucleophilic carbene and said solid support.

39. (Previously presented) A catalytic complex of the formula:



wherein M is Os or Ru;

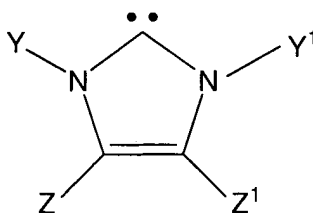
in which carbon atom C is bonded to up to two groups R and R¹;

R and R¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl, and C₁-C₂₀ alkylsulfinyl, each R and R¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₁₀ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy, or with a functional group;

X and X¹ are independently selected from the group consisting of anionic ligands;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

L¹ is of the formula



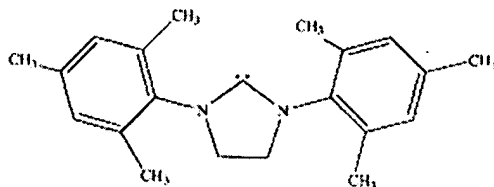
wherein Y and Y¹ are each independently an aryl group substituted with halogen, C₁-C₅ alkyl, or C₁-C₅ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₅ alkoxy, or with a phenyl group substituted

with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

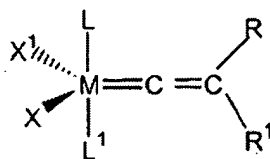
40-43. (Cancelled)

44. (Previously presented) The catalytic complex according to claim 9, wherein L is -P(cyclohexyl)₃, -P(cyclopentyl)₃ or -PPh₃ and L¹ is

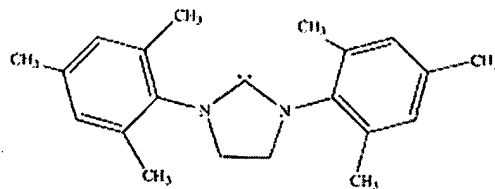


45-46. (Cancelled)

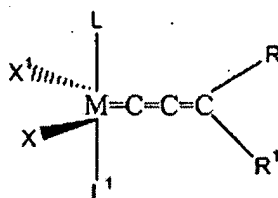
47. (Previously presented) The method according to claim 23, wherein the catalytic complex has the formula:



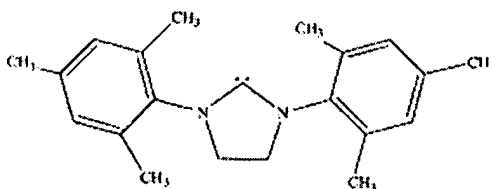
48. (Previously presented) The method according to claim 23, wherein L is -P(cyclohexyl)₃, -P(cyclopentyl)₃ or -PPh₃ and L¹ is



49. (Previously presented) The method according to claim 23, wherein the catalytic complex has the formula:



50. (Previously presented) The method according to claim 49, wherein L is $-\text{P}(\text{cyclohexyl})_3$, $-\text{P}(\text{cyclopentyl})_3$, or $-\text{PPh}_3$ and L^1 is



51. (Previously presented) A catalytic complex according to claim 13, wherein Y and Y^1 are both 2,4,6-trimethylphenyl and Z and Z^1 are both hydrogen.

52. (Previously presented) A catalytic complex according to claim 13, wherein Y and Y^1 are both 2,6-diisopropylphenyl and Z and Z^1 are both hydrogen.

53. (Previously presented) A catalytic complex according to claim 17, wherein Y and Y^1 are both 2,4,6-trimethylphenyl and Z and Z^1 are both hydrogen.

54. (Previously presented) The catalytic complex according to claim 17, wherein Y and Y^1 are both 2,6-diisopropylphenyl and Z and Z^1 are both hydrogen.

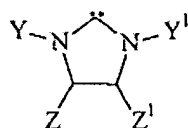
55. (Previously presented) The method according to claim 24, wherein Y and Y^1 are both 2,4,6-trimethylphenyl and Z and Z^1 are both hydrogen.

56. (Previously presented) The method according to claim 24, wherein Y and Y¹ are both 2,6- diisopropylphenyl and Z and Z¹ are both hydrogen.

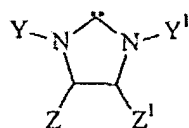
57. (Previously presented) The method according to claim 26, wherein Y and Y¹ are both 2,4,6-trimethylphenyl and Z and Z¹ are both hydrogen.

58. (Previously presented) The method according to claim 26, wherein Y and Y¹ are both 2,6- diisopropylphenyl and Z and Z¹ are both hydrogen.

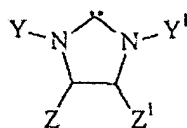
59. (Previously presented) A catalytic complex according to claim 13, wherein said nucleophilic carbene is of the formula:



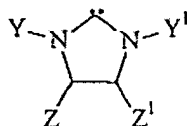
60. (Previously presented) A catalytic complex according to claim 17, wherein said nucleophilic carbene is of the formula:



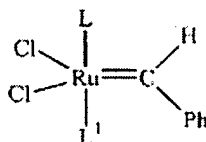
61. (Previously presented) The method of claim 24, wherein the nucleophilic carbene has the formula:



62. (Previously presented) The method of claim 26, wherein the nucleophilic carbene has the formula:



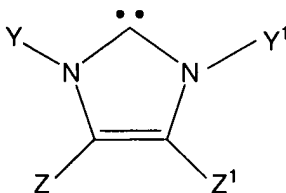
63. (Previously presented) A catalytic complex of the formula:



wherein

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

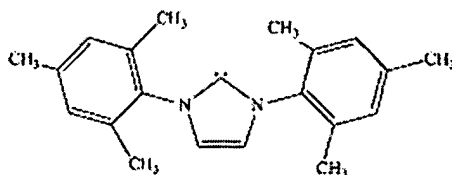
L¹ is a nucleophilic carbene, wherein L¹ is of the formula



wherein Y and Y¹ are each independently an aryl group substituted with halogen, C₁-C₅ alkyl, or C₁-C₅ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

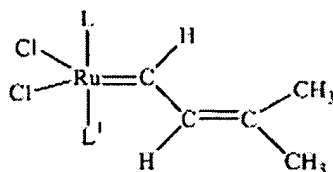
Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂₁-C₂₀ alkoxycarbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₅ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

64. (Previously presented) The catalytic complex of claim 63, wherein L^1 is



65-70. (Cancelled)

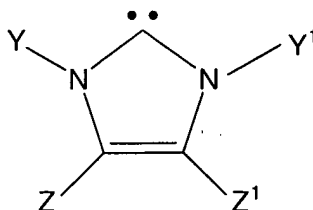
71. (Previously presented) A catalytic complex of the formula:



wherein

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

L^1 is a nucleophilic carbene, wherein L^1 is of the formula

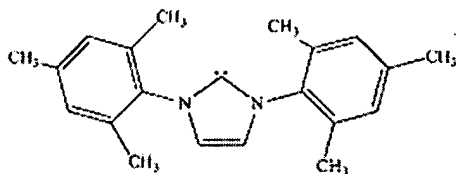


wherein Y and Y^1 are each independently an aryl group substituted with halogen, C_1 - C_5 alkyl, or C_1 - C_5 alkoxy, or with a phenyl group substituted with halogen, C_1 - C_5 alkyl or C_1 - C_5 alkoxy; and

Z and Z^1 are independently selected from the group consisting of hydrogen, C_1 - C_{20} alkyl, C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_{21} - C_{20} alkoxycarbonyl, aryl, C_1 - C_{20} carboxylate,

C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₅ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

72. (Previously presented) The catalytic complex of claim 71, wherein L¹ is

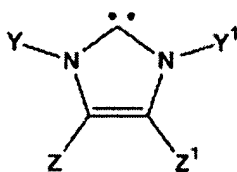


73-76. (Cancelled)

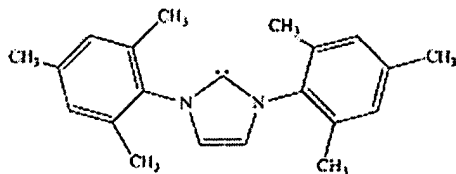
77. (Previously presented) The method of claim 23, wherein the diene is a diterminal diene.

78. (Previously presented) The method of claim 25, wherein the diene is a diterminal diene.

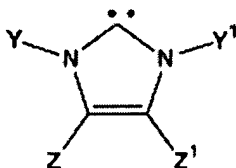
79. (Previously presented) The catalytic complex according to claim 13, wherein the nucleophilic carbene is of the formula:



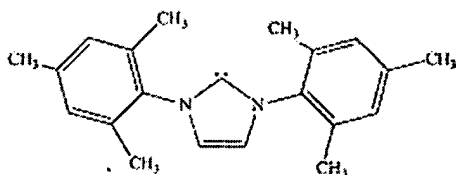
80. (Previously presented) The catalytic complex according to claim 79, wherein the nucleophilic carbene is of the formula:



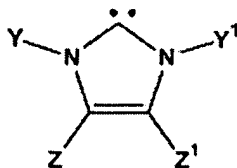
81. (Previously presented) The catalytic complex according to claim 17, wherein the nucleophilic carbene is of the formula



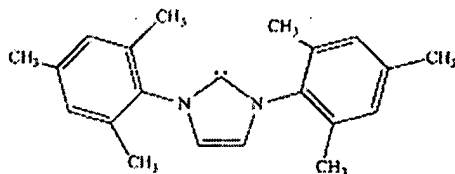
82. (Previously presented) The catalytic complex according to claim 81, wherein the nucleophilic carbene is of the formula:



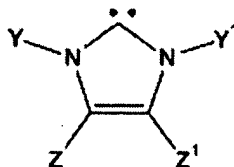
83. (Previously presented) The method according to claim 24, wherein the nucleophilic carbene is of the formula:



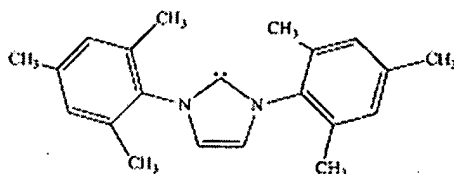
84. (Previously presented) The method according to claim 83, wherein the nucleophilic carbene is of the formula:



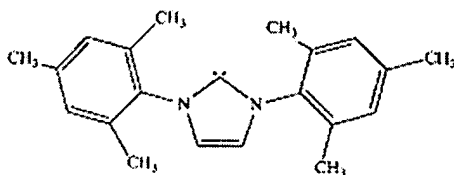
85. (Previously presented) The method according to claim 26, wherein the nucleophilic carbene is of the formula:



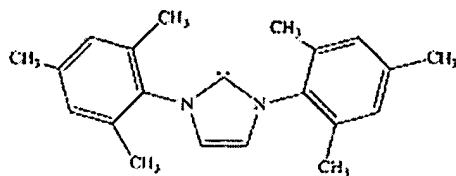
86. (Previously presented) The method according to claim 85, wherein the nucleophilic carbene is of the formula:



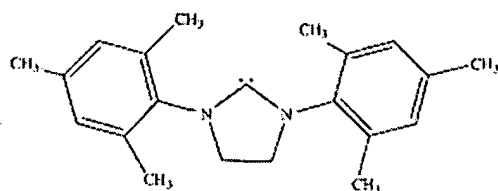
87. (Previously presented) The catalytic complex according to claim 39, wherein L^1 is of the formula:



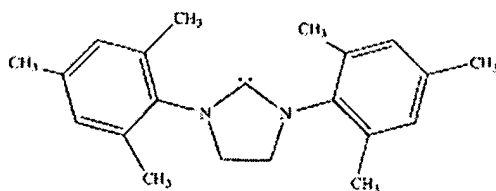
88. (Previously presented) The catalytic complex according to claim 9, wherein L is $-P(\text{cyclohexyl})_3$, $-P(\text{cyclopentyl})_3$, or $-PPh_3$ and L^1 is of the formula:



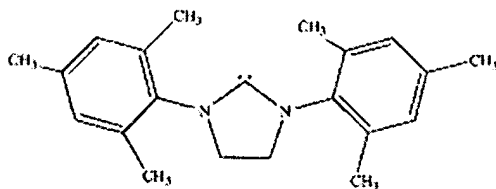
89. (Previously presented) The catalytic complex according to claim 59, wherein the nucleophilic carbene is of the formula:



90. (Previously presented) The catalytic complex according to claim 60, wherein the nucleophilic carbene is of the formula

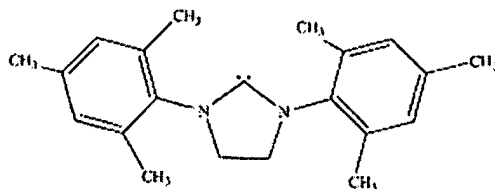


91. (Previously presented) The method according to claim 61, wherein the nucleophilic carbene is of the formula:

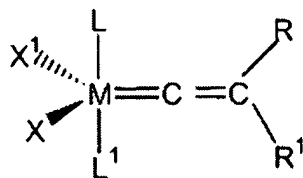


92. (Previously presented) The method according to claim 62, wherein the

nucleophilic carbene is of the formula:



93. (Previously presented) A catalytic complex of the formula:



wherein M is Os or Ru;

R and R¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₁-C₂₀ alkylthio, C₁-C₂₀ alkylsulfonyl, and C₁-C₂₀ alkylsulfinyl, each R and R¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₁₀ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy, or with a functional group;

X and X¹ are independently selected from the group consisting of anionic ligands;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether;

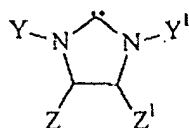
L¹ is a nucleophilic carbene; and

wherein the catalytic complex has one or more further characterization selected from the group consisting of

- (1) at least 2 of X, X¹, L or L¹ are bonded together to form a multidentate ligand[[.]];
 - (2) the complex is linked to a solid support by means of a link between the solid support and the nucleophilic carbene or by means of a link between the solid support and at

least one of the anionic ligands;

(3) L^1 has the formula

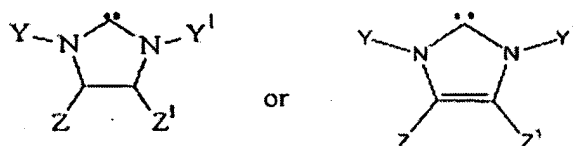


where Y and Y^1 are independently selected from the group consisting of hydrogen, C_1 - C_{20} alkyl, C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_2 - C_{20} alkoxycarbonyl, aryl, C_1 - C_{20} carboxylate, C_1 - C_{20} alkoxy, C_2 - C_{20} alkenyloxy, C_2 - C_{20} alkynyloxy, and aryloxy, each Y and Y^1 optionally being substituted with C_1 - C_5 alkyl, halogen, C_1 - C_6 alkoxy, or with a phenyl group substituted with halogen, C_1 - C_5 alkyl or C_1 - C_5 alkoxy; and

Z and Z^1 are independently selected from the group consisting of hydrogen, C_1 - C_{20} alkyl, C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_2 - C_{20} alkoxycarbonyl, aryl, C_1 - C_{20} carboxylate, C_1 - C_{20} alkoxy, C_2 - C_{20} alkenyloxy, C_2 - C_{20} alkynyloxy, and aryloxy, each Z and Z^1 optionally being substituted with C_1 - C_5 alkyl, halogen, C_1 - C_6 alkoxy, or with a phenyl group substituted with halogen, C_1 - C_5 alkyl or C_1 - C_5 alkoxy; and

(4) any combination of the foregoing characteristics.

94. (Previously presented) The catalytic complex of claim 93, wherein said nucleophilic carbene is of the formula:



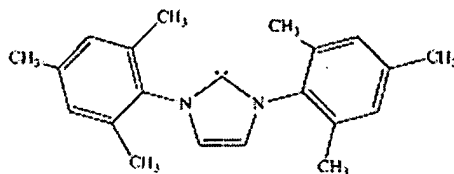
wherein

Y and Y^1 are independently selected from the group consisting of hydrogen, C_1 - C_{20} alkyl, C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_2 - C_{20} alkoxycarbonyl, aryl, C_1 - C_{20} carboxylate, C_1 - C_{20} alkoxy, C_2 - C_{20} alkenyloxy, C_2 - C_{20} alkynyloxy, and aryloxy, each Y and Y^1 optionally being substituted with C_1 - C_5 alkyl, halogen, C_1 - C_6 alkoxy, or with a phenyl group substituted with halogen, C_1 - C_5 alkyl or C_1 - C_5 alkoxy; and

Z and Z^1 are independently selected from the group consisting of hydrogen, C_1 - C_{20} alkyl, C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl, C_2 - C_{20} alkoxycarbonyl, aryl, C_1 - C_{20} carboxylate, C_1 - C_{20} alkoxy, C_2 - C_{20} alkenyloxy, C_2 - C_{20} alkynyloxy, and aryloxy, each Z and Z^1 optionally being

substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

95. (Previously presented) The catalytic complex according to claim 94, wherein the nucleophilic carbene is of the formula:



and wherein the further characterization of the catalytic complex is selected from the group consisting of

- (1) at least 2 of X, X¹, L or L¹ are bonded together to form a multidentate ligand, and
- (2) the complex is linked to a solid support by means of a link between the solid support and the nucleophilic carbene or by means of a link between the solid support and at least one of the anionic ligands.

96. (Previously presented) The catalytic complex of claim 93, wherein the further characterization of the catalytic complex is that at least 2 of X, X¹, L or L¹ are bonded together to form a multidentate ligand.

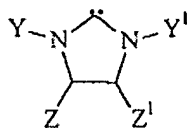
97. (Previously presented) The catalytic complex of claim 93, wherein the further characterization of the catalytic complex is that the complex is linked to a solid support by means of a link between the solid support and the nucleophilic carbene or by means of a link between the solid support and at least one of the anionic ligands.

98. (Previously presented) The catalytic complex of claim 97, wherein the complex is linked to a solid support by means of a link between at least one of the anionic ligands and the solid support.

99. (Previously presented) The catalytic complex according to claim 97, wherein the complex is linked to a solid support by means of a link between the nucleophilic carbene

and said solid support.

100. (Previously presented) The catalytic complex of claim 93, wherein the further characterization of the catalytic complex is that L^1 has the formula



101. (Previously presented) A catalytic complex according to claim 94, wherein Y and Y¹ are both 2,4,6-trimethylphenyl and Z and Z¹ are both hydrogen.

102. (Previously presented) A catalytic complex according to claim 94, wherein Y and Y¹ are both 2,6-diisopropylphenyl and Z and Z¹ are both hydrogen.

103. (Previously presented) The catalytic complex according to claim 93, wherein L is a phosphine.

104. (Previously presented) The catalytic complex according to claim 103, wherein L is $-P(\text{cyclohexyl})_3$, $-P(\text{cyclopentyl})_3$ or $-PPh_3$.

105. (Previously presented) The catalytic complex according to claim 93, wherein X and X¹ are independently selected from the group consisting of halide, carboxylate, alkoxy, aryloxy, and alkyl sulfonate.

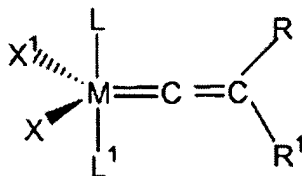
106. (Previously presented) The catalytic complex according to claim 105, wherein X and X¹ are both chloride.

107. (Previously presented) A method for synthesizing a polymer material, the method comprising contacting a monomer composition with the catalytic complex as described in any of claims 9, 14, 39, 44, 63, 64, 71, 72, 87, 88, 93, 98 or 99.

108. (Previously presented) The method of claim 107, wherein the monomer composition comprises a plurality of olefin molecules.

109. (Previously presented) The method of claim 107, wherein the olefin molecules are cyclic olefin molecules.

110. (Previously presented) A catalytic complex of the formula:



wherein M is Os or Ru;

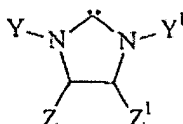
R is hydrogen;

R¹ is tert-butyl;

X and X¹ are chloride;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

L¹ is a nucleophilic carbene of the formula



where Y and Y¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Y and Y¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy; and

Z and Z¹ are independently selected from the group consisting of hydrogen, C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, C₂-C₂₀ alkoxy carbonyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, and aryloxy, each Z and Z¹ optionally being substituted with C₁-C₅ alkyl, halogen, C₁-C₆ alkoxy, or with a phenyl group substituted with halogen, C₁-C₅ alkyl or C₁-C₅ alkoxy.

111. (Previously presented) A catalytic complex according to claim 110, wherein Y and Y¹ are both 2,4,6-trimethylphenyl and Z and Z¹ are both hydrogen.

112. (Previously presented) A catalytic complex according to any of Claims 9, 14, 39, 44, or 93 wherein at least one of R and R¹ is vinyl, phenyl, or hydrogen.

113. (Previously presented) A catalytic complex according to Claim 112 wherein at least one of R and R¹ is phenyl.

114. (Currently amended) A catalytic complex according to any of Claims 9, 14, ~~39, or 44, or 93~~ wherein R and or R¹ together are is an aryl group, and a rearrangement of C¹=C²=C³ with said aryl group forms a ring between C¹ and a carbon atom of said aryl group an indenylidene.

115. (Currently amended) A catalytic complex according to any of Claims 9, 14, ~~39, or 44, or 93~~ wherein R and or R¹ together are is a phenyl group, and a rearrangement of C¹=C²=C³ with said phenyl group forms a ring between C¹ and a carbon atom of said phenyl group a phenylindenylidene.

116. (Previously presented) A catalytic complex according to any of Claims 9, 14, 39, 44, or 93 wherein R and R¹ each independently or together are cyclic or polycyclic.

117. (Previously presented) A method according to Claim 23 or 25 wherein at least one of R and R¹ is vinyl, phenyl, or hydrogen.

118. (Currently amended) A method according to Claim ~~44~~ 117 wherein at least one of R and R¹ is phenyl.

119. (Currently amended) A method according to ~~Claims 23 or 25~~ any of Claims 23, 24, 25, or 26 wherein R or and R¹ together are is an aryl group, and a rearrangement of C¹=C²=C³ with said aryl group forms a ring between C¹ and a carbon atom of said aryl group

an indenylidene.

120. (Currently amended) A method according to ~~Claims 23 or 25~~ any of Claims 23, 24, 25, or 26 wherein R ~~or and~~ R¹ together are is a phenyl group, and a rearrangement of C¹=C²=C³ with said phenyl group forms a ring between C¹ and a carbon atom of said phenyl group a phenylindenylidene.

121. (Previously presented) A method according to Claim 23 or 25 wherein R and R¹ each independently or together are cyclic or polycyclic.

122. (Previously presented) A catalytic complex according to any of Claims 39, 63, 71 or 110 wherein L is -P(cyclohexyl)₃, -P(cyclopentyl)₃, or -PPh₃.

123. (Previously presented) A catalytic complex according to any of Claims 9, 39, 63, 71, 93 or 110 wherein at least two of X, X¹, L or L¹ are bonded together to form a multidentate ligand.

124. (Previously presented) A method according to Claim 23 wherein at least two of X, X¹, L or L¹ are bonded together to form a multidentate ligand.

125. (Previously presented) A catalytic complex according to any of Claims 39, 63, or 71 wherein Y and Y¹ are each independently an aryl group substituted with halogen, C₁-C₅ alkyl, or C₁-C₅ alkoxy groups.

126. (Previously presented) A catalytic complex according to any of Claims 39, 63, or 71 wherein Y and Y¹ are 2,4,6-trimethylphenyl or 2,6-diisopropyl, and Z and Z¹ are hydrogen.

127. (New) A catalytic complex according to Claim 115 wherein R and R¹ are phenyl groups.

128. (New) A method according to Claim 120 wherein R and R¹ are phenyl groups.